

## VTT Technical Research Centre of Finland

### Pre-demolition audit - overall guidance document

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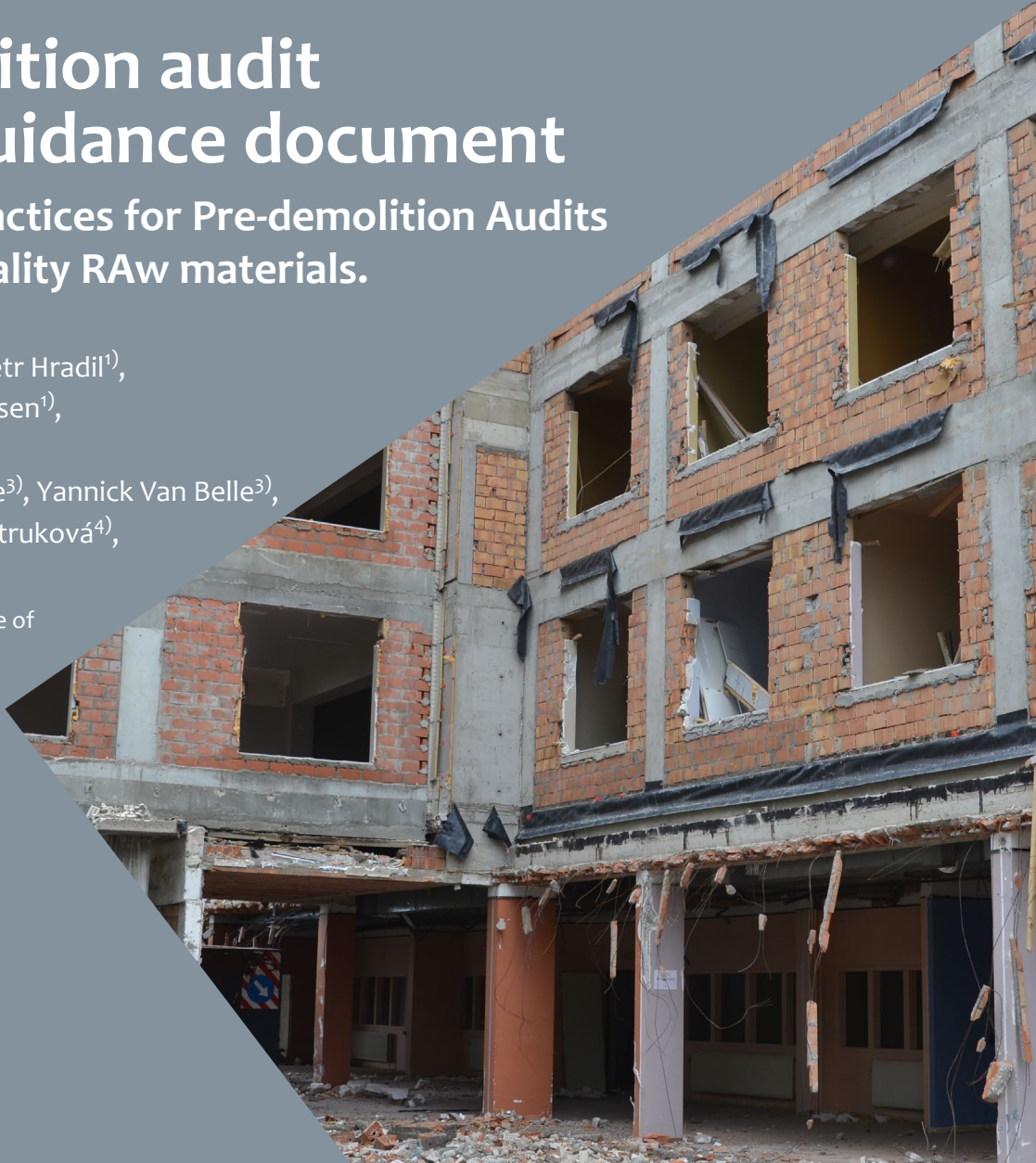
# Pre-demolition audit - overall guidance document

**PARADE. Best practices for Pre-demolition Audits  
ensuring high quality RAw materials.**

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## Foreword

Construction and Demolition Waste (CDW) is by volume the largest waste stream in the European Union. Although a vast majority of CDW is recyclable and reusable, one of the common barriers to recycling and reuse of CDW is the lack of confidence in the quality of recovered materials and components.

This document extends the Waste Audit Guideline published by the European Commission in 2017<sup>1</sup>. The Guideline provides information about the best practices for the assessment of CDW streams prior to demolition or renovation of buildings or infrastructure, called “waste audit”. The aim of the Guideline is to facilitate and maximize recovery of materials and components for beneficial reuse and recycling without compromising the safety measures and practices outlined in the EU Construction & Demolition Waste Management Protocol<sup>2</sup>. This CDW Management Protocol states that:

- Any demolition, renovation or construction project needs to be well planned and managed in order to reduce environmental and health impacts while providing important cost benefits.
- Waste audit (part of pre-demolition audit as defined in the CDW Management Protocol<sup>2</sup>) is to be carried out before any renovation or demolition project, for any materials to be reused or recycled, as well as for hazardous waste.
- Public authorities should decide upon the threshold for pre-demolition audits
- Pre-demolition audits take full account of local markets for CDW, reused and recycled materials.
- A good pre-demolition audit must be carried out by a qualified expert (the auditor).

The scope of this document includes waste from demolition and renovation works. It excludes construction waste, building equipment and excavated or dredged soils.

The guideline has the following target groups of stakeholders:

- Industry practitioners; construction sector (including renovation companies and demolition contractors), waste treatment, transport and logistics as well as recycling companies,
- Public authorities at local, regional, national and EU levels,

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<sup>1</sup> European Commission (2017), EU Guidelines for the Waste Audits ([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))

<sup>2</sup> European Commission (2016), EU Construction and Demolition Waste Protocol ([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))

- Quality certification bodies for building and infrastructure.

This guideline is aligned with European strategies for the construction sector and waste management. It follows the objectives of the Waste Framework Directive 2008/98/EC<sup>3</sup>, which establishes a target of 70% of CDW to be recycled by 2020.

The guideline is also aligned with the Construction 2020 strategy<sup>4</sup>, the Communication on Resource Efficiency Opportunities in the Building Sector<sup>5</sup> and the Circular Economy Package presented by the European Commission in 2015<sup>6</sup>. In this Circular Economy Package, CDW is identified as a key aspect and the preliminary assessment is an essential part of construction and demolition waste management.

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<sup>3</sup> European Commission (2008), Directive 2008/98/EC (<http://ec.europa.eu/environment/waste/framework/index.htm>)

<sup>4</sup> Construction 2020 strategy

<sup>5</sup> Resource Efficiency in the Building Sector

<sup>6</sup> Circular Economy Package

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The project has been coordinated by VTT from Finland. The project group consisted of the following persons:

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Project group

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# 1. Introduction

This document is the overall document for the pre-demolition audit guidance package prepared in the PARADE project. The document package consists of the following documents<sup>7</sup>:

- Brochure: Target groups for the document are all stakeholders involved in the value chain starting with building owners and ending with the end-users of recovered waste materials and products.
- Overall guidance document describing the audit process. Target groups for the document are the auditors, demolition companies.....
- Hazardous materials in construction: auditors, demolition companies, end-users
- Recycling potential: auditors, end-users, demolition companies
- Best practice: all

This guidance document is aligned with the DG GROW framework document. In the preparation of the document especially the Finnish guidance document<sup>8</sup> and the TRACIMAT protocol<sup>9</sup> has been used as base. Also, the systems reviewed in the Nordic report<sup>10</sup> have been noted in the preparation of the overall guidance.

The TRACIMAT protocol is included as an Appendix to this document giving an example of a system for qualitative pre-demolition inventory.

The purpose of the guidance document package is to provide a base for the preparation of national guidance protocol. Member states need to consider specific national features (e.g. types of construction materials used, typology, waste management systems). Furthermore, educational materials for universities have been developed and tested in 2019 (material available from the project website: <https://www.vtt.fi/sites/PARADE>)

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<sup>7</sup> all documents available at: <https://www.vtt.fi/sites/PARADE>

<sup>8</sup> Purkukartoitus (predemolition audit). Finnish Ministry of the Environment. website to be added

<sup>9</sup> to be added

<sup>10</sup> Wahlström, M., zu Castell-Rüdenhausen, M., Hradil P, Hauge Smith, K., Oberender, A., Ahlm, M., Götbring, J., & Bjerre Hansen, J. 2019. Improving quality of construction & demolition waste - Requirements for pre-demolition audit, TemaNord 2019:508 <http://urn.kb.se/resolve?urn=urn:nbn:se:norden:org:diva-5502>





Figure 1 Front pages of all PARADE documents prepared. All documents are available on the PARADE website: <https://www.vtt.fi/sites/PARADE>



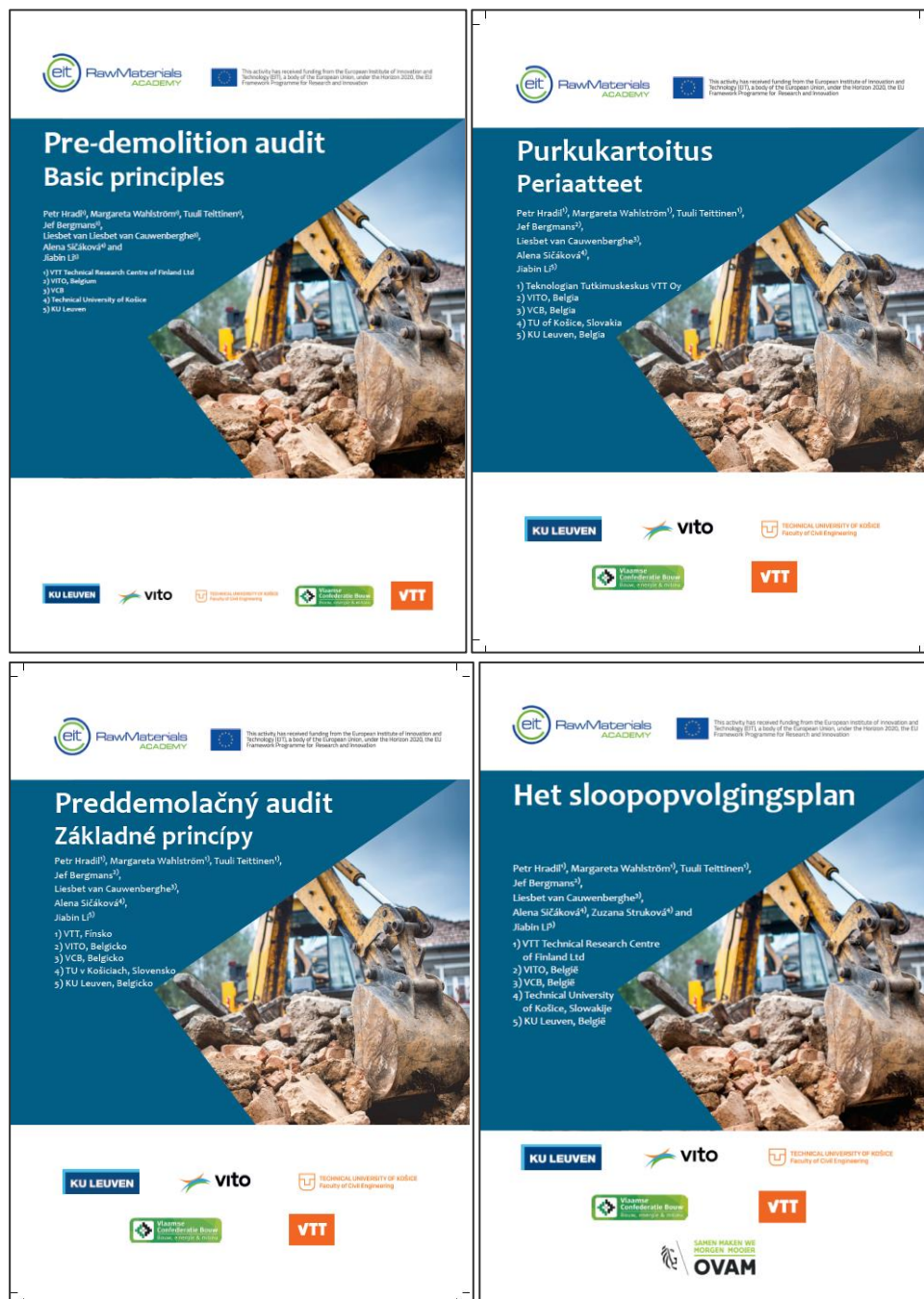


Figure 2. Front pages of the PARADE brochure prepared in English, Finnish, Slovak and Dutch. All brochures are available on the PARADE website: <https://www.vtt.fi/sites/PARADE>

## 2. Basic principles

### 2.1. Ownership of the demolition/renovation waste



In principle, the owner of the building or infrastructure owns the materials and components that are becoming waste. He is typically responsible for their proper management and he will receive any profit from their sale, unless the ownership is transferred to someone else (e.g. demolition contractor).

The owners of the building materials and components must know what they are responsible for. This is true especially before demolition or major renovation works, when the materials and components may be turned into a waste stream and when the hazardous and dangerous substances will need to be taken care of. Therefore, the owner orders the pre-demolition audit.



### 2.2. Definition of pre-demolition audit



A pre-demolition audit is an activity organized by the owner of the building or infrastructure resulting in the inventory of materials and components arising from the future demolition or renovation projects, and their management and recovery options<sup>11</sup>.

A pre-demolition audit consists of two parts<sup>12</sup>:

- a) Identification of materials and components (both hazardous and non-hazardous) that will be generated during the demolition or refurbishment.
- b) Additional information about which materials should if possible be separated at source, which materials can/cannot be reused or recycled, and how.



<sup>11</sup> European Commission (2017), EU Guidelines for the Waste Audits ([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))

<sup>12</sup> European Commission (2016), EU Construction and Demolition Waste Protocol ([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))



The audit can be compulsory (e.g. because of the legal obligation to report materials and components containing hazardous and dangerous substances) or voluntary (e.g. for those seeking BREEAM accreditation<sup>13</sup>).<sup>14</sup>

## 2.3. Identification of hazardous materials and products



It is important that such materials and products are identified prior to the demolition work. Materials and products containing hazardous substances and electrical equipment should be removed first, and then handled and managed separately in a safe manner.

Limitations of the field survey related to access to places have to be clearly mentioned in the waste audit and waste management plan, because parts of buildings that are not visible, covered or otherwise unreachable may contain hazardous materials.



The auditor is required to have a good knowledge of materials and products, building practices and legal requirements for the correct assessment of potentially hazardous materials.

## 2.4. Organization of the audit



A pre-demolition audit is a collaborative effort of the owner, the qualified pre-demolition auditing expert and in some cases, the contractor that will be responsible for the management of generated waste and reusable materials and components.

In the first step, the presence of hazardous substances in materials and components is checked. Reporting of some substances might be compulsory (e.g. asbestos), but it is in the interest of the owner to check all the possible



<sup>13</sup> BRE SmartWaste, Pre-Demolition and Pre-Refurbishment Audits ([https://smartwaste.co.uk/\\_predemolition-and-prerefurbishment-audits](https://smartwaste.co.uk/_predemolition-and-prerefurbishment-audits))

<sup>14</sup> Deloitte (2017), Resource Efficient Use of Mixed Wastes: Improving management of construction and demolition waste ([http://ec.europa.eu/environment/waste/studies/pdf/CDW\\_Final\\_Report.pdf](http://ec.europa.eu/environment/waste/studies/pdf/CDW_Final_Report.pdf))

hazardous substances to identify potential exposure of hazardous materials in connection to demolition work and to avoid future health or environmental damage.



Then the inventory of building materials and components is prepared. It is important to provide as accurate information as possible especially in those materials and components, which are planned to be recovered for reuse or recycling. Low quality of the provided information may lead to the claim from the contractor for the removal of unidentified hazardous waste and or incorrect quantities of hazardous waste.

According to the EU Waste Audit Guidelines<sup>11</sup>, the audit consists of five different activities:



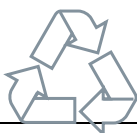
- a) Desk study (documentation research)
- b) Filed survey (on-site visit with optional laboratory testing)
- c) Preparing the inventory (assessment of the collected data)
- d) Management recommendations
- e) Reporting

## 2.5. Reporting



The first part of the pre-demolition audit report should contain all the basic information about the building or infrastructure, its historic use, its owner, the auditor and the contractor (if known). The sources of information, measurement and assessment methods are also listed in this part.

The presence of hazardous substances is reported as a “yes/no” checklist. It is essential that the compulsory substances are always listed even if not present. In some cases, additional information about the substance concentration can be provided in order to check the limits of the material hazardousness or recyclability.



The potential waste materials (hazardous and non-hazardous) are classified according to the EU List of Wastes<sup>15</sup> and their quantity is reported according to

<sup>15</sup> List of Wastes

the EU Waste Measurement Protocol<sup>16</sup>. Apart from the quantity, location, contamination and recoverability of the materials should be reported. Optionally it might be useful to inform about their expected value, environmental footprint and other performance indicators.

The last part of the report contains the summary of all reusable components and equipment that belongs to the building or infrastructure. If they still can become waste, the quantities of their materials must be also reported in the materials inventory.



Finally, it is strongly recommended to provide a comprehensive photo documentation of the building and all the important details such as attachment points of different components, damage or material degradation.

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<sup>16</sup> EU Waste Measurement Protocol

### 3. Pre-demolition audit process

The waste audit consists of documentation research, a field survey, condition evaluation and recommendations for the material and waste management as illustrated in Figure 2.

The aim of the audit is:

- to identify and localize hazardous wastes that will be generated during the demolition, deconstruction or renovation of the building or infrastructure,
- to provide a comprehensive inventory of the non-hazardous wastes according to the requirements of the building authorities,
- to identify reusable building components and recyclable materials,
- to provide additional information requested by the building owner or authorities such as recommended waste management (see “Recommendations” in Figure 1 and Section 6), value of released materials and components, their technical condition and environmental footprint (see “Condition evaluation” in Figure 1 and Section 5).

The results of the audit are recorded in the audit report.

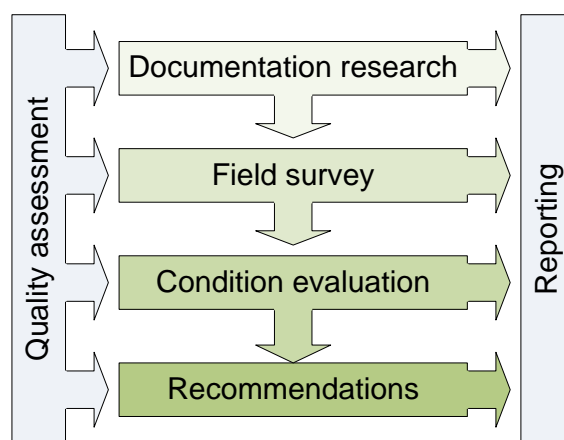


Figure 3 Pre-demolition audit process



## 4. Documentation research

A thorough study of available sources and building documentation should be conducted before or together with the site visit. The extent of the research is typically decided by the auditor, but the minimum requirement is to study technical drawings and material inventory from the design documentation or any more recent documentation of the building or infrastructure.

The aim of research of available documents is

- to provide a first estimation about the materials, their quantities and possible hazardous nature
- to provide indication of the age of the building or infrastructure, structural type and information about attachments/joints of materials and structures,
- to investigate typical building practices and materials used in its location at the time of its construction, surrounding area and access to the site, location of nearest waste management facilities and salvage yards.

Typical sources of documentation are drawings and reports obtained from the building authorities and the owner of the building or infrastructure, memos of housing cooperative board meetings and documentation of the real-estate maintenance company. The information obtained from open public sources should be verified for instance by the data provided by building authorities or directly on site. All sources are then properly listed in the audit report.

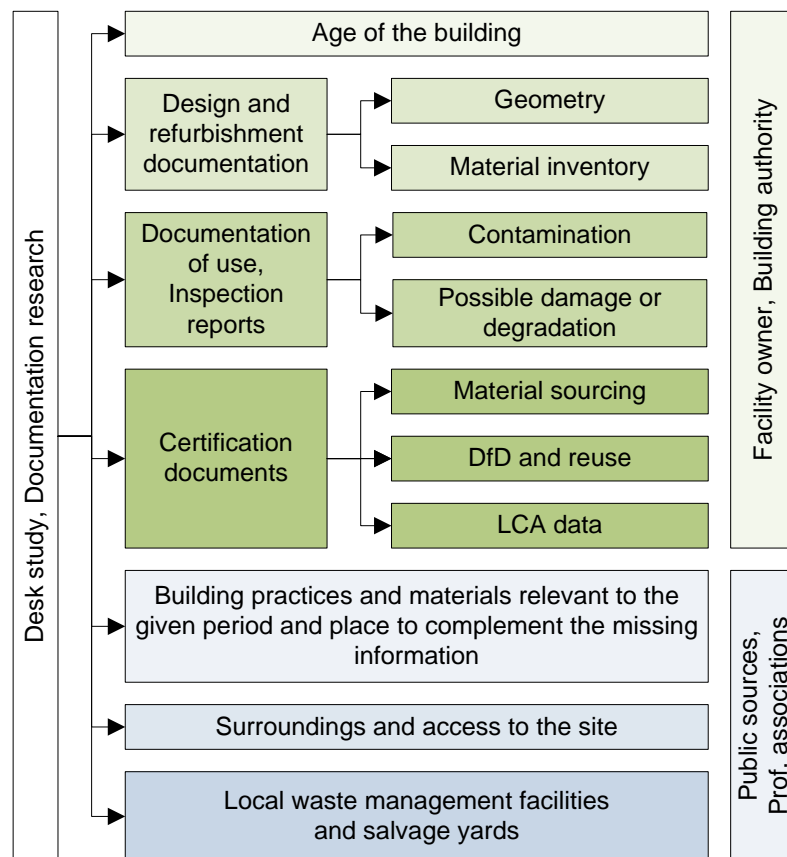


Figure 4 Field survey

#### 4.1. Administrative data

The administrative data should include at least following information:

- address of the building site (potentially including a map with the construction to be demolished or renovated marked)
- name of building owner
- name of auditor(s)
- scope of the work (e.g. inventory of hazardous substances)
- date for pre-demolition audit
- date for the expected start date of the demolition

## 4.2. Description of the project

This activity includes the collection of data about the project and the designated construction(s) to be demolished or renovated, mention the type(s) of construction(s): (partially) residential building – description e.g. private house, apartment, ... / (partially) non-residential building – description of the activity e.g. school, hospital, ... / bridge / tunnel) and type of demolition (complete demolition / renovation / partial demolition / ...).

It should be mentioned for each construction:

- Number of building layers – above ground and underground
- Gross of usable surface
- Construction volume
- Year of construction
- Historical renovations

If the project involves the demolition of a building including external pavement, a description should be given of the type of pavement, surface (or other relevant measurements) and type of construction work (e.g. demolition parking, demolition terrace, demolition private access road).

## 4.3. Review of the available documentation

In the review phase, information can be collected about (previously) construction- and operating permits, plans and building specifications, renovations, previously made (asbestos), inventory and photographs, etc. For industrial properties it's important to know which activities have occurred, when and where (specific location in the building). It is important to know what kind of installations were present in the building and which chemicals were used or stored. Sampling of suspicious materials might be necessary if it is not reported in the available documentation.

### (a) Design and refurbishment plans

Architectural and technical drawings, whether or not accompanied by tender specifications or as-built documentation of the construction and/or renovation works contain information that is useful for planning the field survey and drawing up a waste inventory. They serve for preliminary identification of construction date/period, dimensions, construction typology, composition, type

of materials, location of machinery and installations, details of hidden or difficult to access spaces, as well as planning of a field survey.

It is recommended to study any available design and refurbishment documentation

- to obtain the age of the building or infrastructure and their parts,
- to identify the basic building materials, components and structural systems,
- to prepare the field survey and decide about examination methods during the survey.

#### **(b) Documentation of use and inspection reports, activities and permits**

The aim of research of use and inspection reports is primarily to gather information on storage and use of hazardous products that might have caused contamination of other materials. It also verifies the findings obtained from the public sources and design documentation.

It is recommended to study any available documentation of use of the building, infrastructure or their parts to identify possible changes of the original building layout, materials or coatings. It is also recommended to study any available inspection reports to identify the possible material deterioration, contamination, components damage and locations for sampling.

In the description of the business activities and operating permits, often useful information can be found about storage and the use of hazardous products and the presence of heating- and cooling installations, transformers, and (underground) storage tanks. The operating permits and company folders can also provide information about the timing of these activities and the nature of certain materials.

#### **(c) Certification documents**

Documents such as CE marking and Declaration of Performance of harmonized construction products can be important to understand the conformity of the reusable products with the current standards and to complement the knowledge about properties of the recyclable materials. This concerns products manufactured after 2000, when the first product standards were harmonized.

It is recommended to study any available material certification to provide the information about the quality of the material used in the building construction or maintenance interventions.

Certification of building sustainability is another source of the information about the recyclability and reusability of materials. The research on sustainability certification may focus on

- design for deconstruction and reuse,
- material sourcing and recycled content in materials,
- material connections and interfaces,
- environmental footprint of materials.

#### (d) Other sources

It is important to identify risk of presence of hazardous materials and other risks associated with the on-site activities. For that reason, the review of guidance materials provided by local professional associations is important in order to get knowledge about common building materials, construction systems and connection methods typical for the building age, type and location.

If the audit contains recommendations on on-site and off-site material management, it is recommended to study available maps, charts and urban plans to find the most suitable access route for the material transport and machinery and temporary storage area for the recovered materials and components. The databases of local waste management facilities and salvage yards can provide information about the most viable off-site waste management options and about possible material dealers for the recovered building components.

The study of additional sources may include:

- **Photographs** - Short notification about available documents/sources.
- **Existing asbestos inventory/inventories** - Short notification about available documents – if applicable.
- **Existing demolition inventory/inventories** - Short notification about available documents – if applicable.
- **Soil survey(s)** - Short notification about available documents – if applicable.

External pavement - If the project involves the demolition of a building including the external pavements, a short notification about the available information should be given here (e.g. information about the used foundation, year of construction).

## 5. Field survey

The field survey is the basic requirement of the audit, condition evaluation and recommendation for the management of released waste, materials and components.

The aim of the field survey is

- to verify and update the information obtained in the documentation research,
- to obtain indications of hazard scenarios and exposure of the building materials and components,
- to determine the current condition of the building and its materials,
- to identify and mark the reusable components,
- to collect material samples for the laboratory testing.

If the presence of hazardous materials is suspected, protocols to work with hazardous materials shall be followed and worker protection measures shall be applied during the field survey. During the field survey, the building or infrastructure is visually inspected and inventoried. If necessary, samples are taken for analysis. The work shall be performed systematically and methodically. A recommended approach consists of 4 parts:

- a site visit and general analysis of the building
- a general survey to have an idea about type and location of released materials and to prepare the necessary equipment for the next steps,
- a detailed survey, measurements and on-site scanning to prepare the material inventory and waste declaration,
- sampling and analysis to obtain the quality, contamination and level of deterioration of materials.

The description of the survey, sampling and measurement methods shall be included in the audit report.



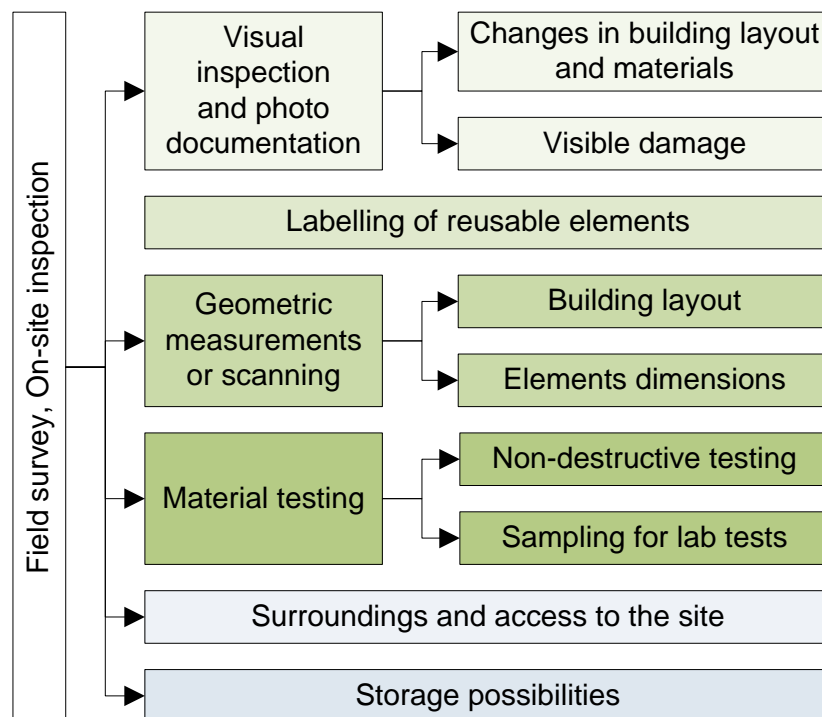


Figure 5 Field survey

## 5.1. General recommendations

### (a) Visual examination and photo documentation

During the visual inspection, the auditor should aim to:

- evaluate the consistency of the design documents and documents of the property owners with the actual situation,
- identify locations, different structure and technical systems and their materials, with special care for materials that can look very similar, for instance in the cases of complex systems where a material can be covered by another material,
- make diagrams, notes, take photos of the different parts and include them in the report.
- make sure to identify all the accessible materials (it is sometimes important to remove a small part of the surface layers or drill a hole to make sure that the materials underneath are those expected).

#### **(b) Marking of reusable components**

The components intended for deconstruction and reuse need to be visibly marked and their location noted in the building or infrastructure plan (such as paper or electronic drawing or BIM). The labels have to be unique (e.g. number, barcode or RFID tag) so the original location of each of the components will be known after the deconstruction.

#### **(c) Geometric measurements and on-site scanning**

External dimensions and internal spaces can be verified by the adequate measurement methods. If there is any need for higher accuracy of the measurement or if there is requirement to build computer model of the building or infrastructure, more advanced methods can be used such as laser scanning, LIDAR or photogrammetry.

It is important to document also internal cavities, water leakage and materials in the core of composite building components. If it is not possible to drill or remove material layers, non-destructive methods can be used such as spectrometer, magnetometer, infrared camera, ultrasound, or ground penetration radar.

The measurement methods and equipment are documented in the audit report.

#### **(d) Material testing**

If the on-site measurements and scanning do not provide comprehensive information, the auditor may need to take samples of the materials for the further laboratory testing.

It is recommended to visually inspect the samples at the moment of their collection and report the observations. The sampling and testing methods are included in the report as well as the results and conclusions from the analysis.

#### **(e) Additional survey**

The area surrounding the demolition, deconstruction or renovation site should be inspected with regards to

- neighbouring objects that can be affected by the recommended deconstruction and on-site management methods, especially noise and dust
- accessibility for the vehicles
- temporary storage possibilities for recovered materials and components

## 5.2. Hazardous materials

### Asbestos

Presence of asbestos in constructions needs special attention in construction built before 1995. The use of asbestos has since 1994 been banned in almost all European member states. Most countries have common practice setting legal requirements for asbestos inventory of building prior to demolition.

Wastes containing asbestos are classified as hazardous waste. Management of asbestos waste need to fulfil the legislative requirements (e.g. licencing for removal of asbestos from construction, packaging, and disposal).

For further information, see document on hazardous materials in construction and the Tracimat protocol (Appendix B)

### Materials others than asbestos

Other materials than asbestos of concern are hazardous substances setting requirement on waste management or impurities limiting the recyclability of construction materials.

Examples of hazardous substances potentially present in historical construction products are additives or chemicals or hazardous components used in the construction products (e.g. flame retardants, impregnation chemicals, PCB, creosotes, mercury, etc) or contaminants from the use of the construction (e.g. oil spills on floors, PAH substances in flue gas channels etc). Also, radioactive substances may appear (e.g. fire warning systems). Electronic equipment is typically regarded as hazardous waste (e.g. fluorescence lamps).

Wastes containing hazardous substances are classified as hazardous primarily based on the European list of waste. In some cases, a particular type of waste on the list can be either hazardous or non-hazardous depending on the specific properties of the waste. In the latter case the waste status must be assessed based on its hazardous properties. This means in practice that the content of the hazardous substance is compared to hazardous waste classification as well as substance-specific limit values.

The waste classification has several implications. There are numerous EU regulations setting special requirements for waste defined as hazardous waste (e.g. shipment, landfilling, and treatment).

For further information, see document on hazardous materials in construction.

### **5.3. Non-hazardous materials and reusable products**

Focus in inventory is to identify following products or waste materials:

- interior building products to be removed prior to demolition (e.g. stairs, doors, glass panels, floors and chairs)
- structural elements, beams for reuse
- concrete, steel, wood, glass, gypsum, plastics etc for material recovery or final treatment

Especially the separability of different products, elements and materials and safety aspects in deconstruction require attention.

Important part of the work is to assess the quality of the materials, the potential degradation and ageing which is limiting reuse or recycling. Impurities in materials (e.g. glues, mortar) for recycling lower the material value. Clear requirements on limits for impurities are needed for assessment when materials can be regarded recyclable (in demolition: yes/no answers needed)

There are no harmonised tools or concepts for performing the inventories. In special cases wearable device (e.g. HS Laser) has been used for material identification, but not yet widely used.

### **5.4. Limitations of the investigation**

In some cases, certain materials cannot be inventoried (or measured) because they are not visible / (partially) encapsulated / unreachable. Examples: foundations, underground pipelines and cables, underground storage tanks, permanent formwork in asbestos cement. Limitations of the field survey must be clearly mentioned in the waste audit and waste management plan.

Hazardous materials not discovered in the pre-demolition audit may lead to increased costs for waste management and cause stops in the demolition work.

## 6. Inventory and reporting

The final report of the audit is typically prepared and signed by the auditor to ascertain the accuracy of the content. It may contain several parts prepared by different auditors (for instance, it is recommended that the hazardous waste declaration is prepared by the independent auditor).

The report includes the information regarding the project itself, all the information collected during the documentation research and field survey and any information that can be useful for the owner, the contractor or any other stakeholder involved in the recovery and management of waste materials and components.

Description of the field survey includes

- the objective stating why particular information is sought,
- the survey plan,
- description and reasons for choice of investigation methods,
- information concerning the representativeness of the measurements and sampling,
- information concerning the equipment needed for the survey,
- photo documentation and additional drawings.

It is recommended that the report follows the structure outlined in “Annex A: Structure of the audit report”

It is the duty of the waste holder to have knowledge about the objects and substances intended to be discarded and their potentially hazardous nature and contamination. The inventory of the materials and building elements is therefore the basic and the most important output of the pre-demolition audit. The inventory is typically based on the materials assessment provided by the documentation research and/or the field survey.

The materials assessment should include at least:

- type of material and its hazardous nature classified according to the European List of Wastes,
- quantification in tonnes, cubic meters and/or other relevant units of measurement.

Additional information can be required by the waste holder or building authority such as:

- inventory of components recommended for deconstruction and reuse. Materials of these components should not be excluded from the waste inventory (exceptions may exist e.g. if the components are already sold to the new owner),
- location of the waste materials (and components) in the building in order to maximize the efficiency and safety of demolition or renovation,
- waste management recommendations,
- quality, value or environmental footprint of the released materials and components.

Recommended content of the waste/material declaration is in “Annex B: Content of the inventory”.



## 7. Quality assessment

The quality of the pre-demolition audit depends on skills and expertise of the auditor and traceability of the information provided by the waste declaration.

### 7.1. Requirements for the waste holder

The waste holder performs the audit or organize independent auditor to carry out the audit on his behalf. It is recommended to have independent auditor for the hazardous waste.

After the waste holder submits the waste declaration to the building authorities it is recommended that, he keeps the final report of the audit for bookkeeping until the final inspection is concluded on the demolition/renovation site.

Non-hazardous wastes, reusable components and hazardous wastes that do not fulfil these conditions can be self-declared by the waste holder.

Furthermore, the waste holder's responsibilities need to be defined. It is recommended that the waste holder is responsible for the knowledge of amount and nature of the produced waste.

### 7.2. Requirements for the auditor

It is recommended that independent audit on hazardous wastes is carried out by a specialized auditing company if the building meets criteria (e.g. certain building period, floor size or location) to suspect the presence of hazardous materials.

It is recommended that national recommendations are given for the competence or qualification of the auditor(s), e.g. skills and potential certifications

As a minimum requirement, the auditor shall have sufficient knowledge and experience to identify hazardous materials and to fulfil the legal requirements for the pre-demolition audit. It is recommended that the auditor is independent in all demolition, deconstruction or renovation projects so the audit results are not biased by the specific interests of the owner or contractor.

It is also recommended that the auditor has adequate education or training on current and historical construction, constructive systems, standardization, materials and hazardous substances.

### 7.3. Traceability of the information

It is important to ascertain the quality of the performed audit by the revision of its outcomes. This should be done preferably in 3 stages.

**Stage 1:** Initial assessment during the waste audit. After the waste audit is performed (and registered) it may to be checked for its quality (by third-party certified auditor, public bodies or professional associations).

**Stage 2:** Verification after or during demolition, deconstruction or renovation works. It is important to consider:

- decontamination and removal of hazardous wastes,
- on-site management,
- amounts of materials sent for off-site management and disposal should be compared with the declaration. Discrepancies should be notified and justified.

**Stage 3:** Verification of the off-site management and disposal process. Considering not only the amounts and separation rates, but also the type of waste management performed. Any discrepancy found should be notified and justified.

### 7.4. Validity of the waste/material audit

It is recommended that the validity of the audit is limited to a certain period from the date of the signature of the final report.

## 8. Recommendations and future aspects

The EU legislation (Waste framework directive, List of waste, etc) and EU guidelines (Waste Audit Framework, CDW Management Protocol) form the base for the implementation of the pre-demolition audit. However, most of the implementation must be decided at the national level (see chapter 7).

Predemolition audit shall be done prior to demolition bidding.

It is recommended that the waste reported in the audit is compared to actual waste amount arising from demolition or renovation work. This information can in future be used to develop and validate methods to estimate future waste amounts from different building types before demolition. Especially if a significant decontamination of the building is needed, it is recommended that a check on the appropriate removal of hazardous materials based on the recommendations in the audit report are done prior to demolition.

Special attention is needed on construction products that are reusable. Also a review on the recycling potential of different materials that can be separated is recommended to be included in the audit report. Templates or electronic forms for waste audit reporting are also support implementation. In future, data on reusable components and recyclable materials can also be made visible and marketed through electronic market places.

Tools for material inventory, e.g. use of handheld spectroscopy and hyperspectral imaging devices for material identifications, also modern scanning and remotely controlled technologies , may in future be available. Today these are only used in special cases.

## Annex A: Structure of the audit report

The following recommended structure of the audit report is in line with the European waste audit guidance and based on the Tracimat system.

### **Audit report**

**Section 1:** General information (site, owner, auditor, contractor, scope of the audit)

**Section 2:** Description of the methods

Section 2a: documentation research

Section 2b: field study (sampling methods, tools, laboratory analysis)

**Section 3:** Results and conclusions of the audit

### **Appendices**

**Appendix 1:** Project location plan

**Appendix 2:** Identification of hazardous substances

Appendix 2a: Declaration of the presence of hazardous substances

Appendix 2b: Destructive asbestos inventory

Appendix 2c: Samples and analysis results of other materials then asbestos

Appendix 2c-1: Sampling plan

Appendix 2c-2: Test results or analysis

**Appendix 3:** Declaration of waste, materials and reusable components

Appendix 3a: inventory of the materials containing asbestos

Appendix 3b: inventory of other hazardous waste

Appendix 3c: inventory of non-hazardous waste and materials

Appendix 3d: inventory of reusable components

**Appendix 4:** Pictures

**Appendix 5:** Preliminary (historical) research

Appendix 5a: Business activities and permits

Appendix 5b: Construction plans and building specifications

Appendix 5c: Photographs

Appendix 5d: Existing asbestos inventory

Appendix 5e: Existing demolition inventory

**Appendix 6:** External pavement

Appendix 6a: Plan with location of drillings

Appendix 6b: Drilling descriptions

Appendix 6c: Results of tests and analyses

## Annex B: Content of the inventory

It is recommended that the waste/material declaration contains the following parts:

- Identification of hazardous or dangerous substances, recommended structure in Table 1,
- Declaration of waste and materials quantities, recommended structure in Table 2, and
- Declaration of reusable components, recommended structure in Table 3.

The information in the tables should follow the recommended format:

- Substance: name of the substance that was investigated
- Material: name of the material according to the European List of Wastes<sup>17</sup>
- Reusable component: (a) producer and type or (b) description of the component
- Code: waste code according to the European List of Wastes<sup>17</sup>
- Quantity: (a) tonnes, (b) cubic meters or (c) number of components<sup>18</sup>
- Location: description of the location of the material or component
- Condition: level of deterioration and other relevant technical condition
- Recommended treatment: waste management name and code according to the Waste Framework Directive<sup>19</sup> or another form of treatment
- Value: estimated value of the material or component(s)
- Environmental footprint: (a) estimated embodied carbon including end-of-life treatment, (b) estimated embodied energy including end-of-life treatment or (c) link to the Environmental Product Declaration according to the CEN/TC 350 methodology<sup>20</sup>.

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<sup>17</sup> Commission Decision of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste, Brussels, 2000, accessed online at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02000D0532-20150601>

<sup>18</sup> European Network of Construction Companies for Research and Development (ENCORD): Construction Waste Measurement Protocol, Brussels, 2013, accessed online at: <http://www.encord.org/wp-content/uploads/2013/06/2013-05-ENCORD-Waste-Measurement-Protocol-Issue-V1-Low-Res.pdf>

<sup>19</sup> Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives, Official Journal of the European Union, L 312/3, Brussels, 22.11.2008, accessed online at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0098>

<sup>20</sup> European Committee for Standardization (CEN), TC-350 webpage, accessed online at: [https://standards.cen.eu/dyn/www/f?p=204:32:0:::FSP\\_ORG\\_ID,FSP\\_LANG\\_ID:501953,25&cs=12CD2903352A580376686F218D222AC7A](https://standards.cen.eu/dyn/www/f?p=204:32:0:::FSP_ORG_ID,FSP_LANG_ID:501953,25&cs=12CD2903352A580376686F218D222AC7A)

## Identification of hazardous and dangerous substances

The purpose of this activity is to summarize the presence of hazardous substances and materials of concern in the building and infrastructure that may affect the on-site work and material management. It is necessary to report the presence (yes/no) of all substances, of which reporting is mandatory under local regulations.

Table 1 Recommended content for hazardous and dangerous substances identification

Mandatory				
Substance	Present	Quantity or concentration	Location	Recommended treatment
	yes / no			
	yes / no			
	yes / no			

If there is a limit quantity/concentration for the substance in the material to become non-recyclable or hazardous, its measured value is reported in the table. If the substance present in several locations, it can be reported in more lines.

## Examples of hazardous substances and materials of concern in construction

- Asbestos
- PCB
  - paints
  - sealants
  - kits in double glazed windows
  - condensators
- PAH & creosote
- Oil, hydrocarbons
  - spills
- Harmful metals
- Brominated flame retardants
- Phtalates



## Declaration of waste, materials and reusable components

The declaration summarizes quantities of materials (including those contaminated with the hazardous substances listed in Table 1. It is possible to separate the table into several parts (e.g. materials containing asbestos, other hazardous waste and non-hazardous materials).

Table 2 Recommended content for waste and materials declaration

Mandatory			Optional			
Material	LoW Code	Quantity	Location	Condition	Recommended treatment	Additional information (e.g. value or environmental footprint)

It is recommended to declare embedded building components that cannot be removed prior to the deconstruction/demolition work, but will be separated and reused according to Table 3. As long as their reuse is not confirmed (e.g. by the contract between their owner and the new one), the quantities of materials contained in those components shall be reported also in Table 2.

Table 3 Recommended content for reusable components declaration

Optional				
Reusable component	Dimensions	Quantity	Location	Additional information (e.g. value or environmental footprint)

## Annex C: Tracimat reporting template

### 1. General description

**a) Address of the site:**

.....

**b) Name of the building and/or the parts of the building included in the inventory**

.....  
.....

**c) Scope:**

Please indicate if it's an addition to (a) the prior inventory(s) or a complete study. If it concerns an additional inventory, it should include all of the conclusions of the previous studies.

**d) Client:**

.....

**e) Laboratory:**

Data of the approved laboratory/laboratoires which is/are in charge of the analysis of the samples that have been taken.

Organization:

Street + number, postal code, city:

**f) Date(s) of visit(s) on site:**

.....  
.....  
.....

**g) Person of contact in the building:**

.....  
.....  
.....

### 2. Scope of the investigation

**a) Geographical size:**

**b) History of the building:**

*The following guidelines should be taken into account.*

- Specify the year or the years of construction and possible renovations, as well as the kind of material used.
- Collect existing plans of the building.
- Collect the available technical data of machines and the other elements of the construction that may contain asbestos (technical data sheet,...).
- Make a list of previously executed inventories and their references (author, year in which they were made, type of document,...)
- Make a list of any previously executed works and its characteristics (year of execution, description of the executed works, references of any permits for asbestos removal,...)
- ...

### 3. Potential restriction

## 4 Description of the method used to develop the inventory: samples and analysis

### 4.1 Sampling method

*Describe the method*

*The following conditions must be respected.*

*Seals of the technical connections, surface lining, (eg. plasterwork), mastic, roofing, the protection of metal support structures, vertical and horizontal separations,... are systematically checked for the presence of asbestos.*

*The samples are big enough to be representative. In general, the samples have at least a volume of 2cm<sup>3</sup>.*

*To be representative, the samples of fragile materials are taken up on the carrier. The tools for the samples must be hand tools (no power tools) and are for single use, or they must be easy to clean to prevent cross-contamination.*

*In order to limit the spreading of fibers and depending on their nature, the materials from which the samples are taken, should be moistened prior to the sampling.*

*The operator ensures that people, that should not be present during the sampling, keep their distance. The operator carries the necessary equipment for respiratory protection. Depending on the nature of the material and the state of degradation, he can spread a plastic foil under the zone where the samples are taken, to prevent contamination, he will also wear a protective disposable work coat. After sampling the debris are picked up and the carrier is cleaned with a damp cloth. The holes are sealed off.*

*Specific case of heat-insulating material: in order to have representative samples, it is necessary to know the different layers, from the outside up to the metal tube.*

*Material that should not be added to the heat-insulating material: the mineral wool, which is often found between the tube and the asbestos insulation. When this material is added to a sample, the stiff fibers of the glass wool hamper the detection of small amounts of amosite in the rest of the sample.*

*Specific case of spray asbestos: the samples are taken over the entire thickness. Sampling of spray asbestos should be done carefully.*

*Specific case of suspended ceilings, the inspector must inform himself about the nature of the panels, the nature of the ceiling above it (concrete, metal, wood,...), the nature of support structure (concrete pillar, metal beams, supporting walls,...), the existence of pipes above the suspended ceilings (supply- and outlet pipes of the ventilation, hot- and cold water pipes,...) and whether they are coated with insulating material. He must also know how these plates are attached to the ceiling (asbestos ropes at the hanging bars) and whether fire-resistant elements are present.*

*The access to places that are difficult to reach should be facilitated by the use of appropriate techniques, such as the removal of decorative elements or by using more advanced tools such as an endoscope.*

*At this stage it is necessary to evaluate the amount and location of the destructive probes that are needed to execute the study.*

*When a building is still in use, the probing should be done after the occupied hours and the material should be restored to its original condition.*

*The used technique may not have the effect that the number of asbestos fibers, that are possibly in the air, are increased.*

*Asphalt and bitumen roofing always need to be checked for the presence of tar, eg. by a spray test based on PAH. Also the following hazardous waste may be present: contaminated wood, coolants in transformers, walls and floors contaminated with eg. PAH or mineral oil...*

.....  
.....  
.....

## 4.2 Working tools of the auditor

*Brief description of the used tools during the survey and the sampling (eg. rangefinder, hand tools, magnet,...).....*

.....  
.....

#### 4.3 Marking and detection in the field

*Describe the method for marking the samples in the field.*

*The following guidelines should be followed:*

*Each location where a sample was taken, is identified in the field and in the report.*

*A picture of the place where the sample was taken, will be included in the report. The auditor should pay attention that when taking a picture of the location of the sample, it can be recognized.*

*A pictures of other applications that the auditor recognizes during his visit as asbestos (type of asbestos cement, asbestos-containing industrial material,...) are also attached to this inventory.*

*The location of the sampling and the detected asbestos applications are marked on existing plans*

.....  
.....  
.....

#### 4.4 Number of samples

*Describe the way that number of samples is determined.*

.....  
.....  
.....

#### 4.5 Analysis in the lab

*Each sample should correspond to an analysis. The samples should not be mixed before the analysis is done. Indicate the standard used as reference for the analysis of the samples to determine the presence of different types of asbestos. Also describe the methods used for different analyses by the official laboratory: visual analytics, stereo microscope, polarizing microscope,...*

## 5 Results

### 5.1 Overview of suspected asbestos materials determined during the investigation.

*List all suspected asbestos materials identified during the site visit. This list should be as clear as possible and set up in a logical order (for each building, floor by floor, by type of material,... depending on the case) according to the following model.*

<b>Reference (number according sheet and plan)</b>	<b>Location - as accurate as possible (building - floor - room - ...)</b>	<b>Type of application</b>	<b>Fixation</b>	<b>Condition</b>	<b>Estimated amount</b>	<b>Picture</b>	<b>Sample number</b>

## 5.2 Overview of the suspected asbestos materials after analysis

*List of all materials that contain asbestos or that were contaminated with asbestos. This list should be as clear as possible and set up in a logical order (for each building, floor by floor, by type of material,... depending on the case) according to the following model.*

<b>Reference (number according sheet and plan)</b>	<b>Location - as accurate as possible (building - floor - room - ...)</b>	<b>Type of application</b>	<b>Fixation</b>	<b>State (condition and shape)</b>	<b>Estimated amount</b>	<b>Picture</b>	<b>Sample number</b>





### 5.3 Descriptive sheet of suspected asbestos materials

*Make a descriptive sheet for each suspicious application found by the auditor during his/her visit, according to the model below.*

PICTURE	
Characteristics	
Number(s) of the application and of its possible samples.	<i>These numbers are mentioned on the plans that are included in the inventory, as well as in the laboratory sheets.</i>
Type of material	<i>Describe the type of application</i>
Precise location (s) of the suspicious material	<i>Floor(s), number or name of the room, ... Include all information that helps to determine the location of the suspicious material. This location should be precisely described.</i>
Number of samples of the suspicious material and location of the sampling of the suspicious material.	<i>Note the number of samples that were eventually taken, and the place on the material (if relevant).</i>
Estimated amount of the suspicious material to which this sheet relates.	<i>Depending on the type of application (m<sup>2</sup>, m<sup>3</sup>, m, number, ...).</i>
Fixation	<i>Describe the way in which the material / application is fixed.</i>
State of degradation, possible damage and its extent.	<i>Describe the general state of the material (heavily damaged or eroded, slightly damaged or eroded, no damage).</i>
Possible remarks	

Conclusion	
Presence or absence of asbestos	
Sample number	
Type of asbestos	<i>Specify the nature of the material (% volume and type of asbestos which <u>may or may not be present</u>), with reference to the results of the analyzes of the laboratory (if available) and the possible trading name (Eternit, Pical, Glasal, Massal, Klingerite, Menuiserite, Progypsol, ...).</i>
Friable / non friable	
Risk of exposure	
Proposed controle measures	
Proposed method of removal	

# Appendix

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## 1 Plans

### *General information on the plan*

- *titel of the plan*
- *reference number of the inventory.*
- *Information that indicates clearly the location (adres, floor level, ...)*
- *Origin of the plan (autor, organisation, ...)*

### *To be indicated on the plans:*

- *All points where samples were taken (with corresponding number),*
- *The type of asbestos containing material (including the number of the corresponding waste sheet) detected during the site visit.*

.....

.....

.....

## 2 Analysis report

### *Include all the analysis reports of the certified lab.*

.....

.....

.....

## 3 Other documents

### *Add all relevant documents that can be of use to understand the report.*

.....

.....

.....

## Annex D: Glossary

**Accreditation**<sup>21</sup> denotes both a status and process<sup>22</sup>. As a status, it denotes conformity to a specific standard as set forth by an accrediting agency and as a process, it shows a commitment to continuous improvement. Accreditation means that the certification body meets the requirements of a national or an international standard as assessed by an accrediting agency.

**Auditor**<sup>23</sup> means the expert or the team of experts (auditors team) performing the waste audit. It can be represented by the building owner or consultant (e.g. an architect or structure engineer) acting on behalf of the owner.

**Authority**<sup>23</sup> (building authority) means the national or regional administration responsible for granting the demolition or renovation permits and supervision of the demolition or renovation process.

**Backfilling**<sup>21</sup> is any recovery operation where suitable waste is used for reclamation purposes in excavated areas or for engineering purposes in landscaping or construction instead of other non-waste materials, which would otherwise have been used for that purpose<sup>24</sup>.

**CE Marking**<sup>21</sup> for construction products indicates that manufacturers take responsibility for the conformity of their products with the declared performance<sup>25</sup>.

**Certification**<sup>21</sup> is a procedure by which a third party gives written assurance that a product, process or service is in conformity with certain standards<sup>26</sup>. Certification can be seen as a form of communication along the supply chain. The certificate demonstrates to the buyer that the supplier complies with certain standards, which might be more convincing than if the supplier itself provided the assurance.

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<sup>21</sup> European Commission (2016), EU Construction and Demolition Waste Protocol ([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))

<sup>22</sup> ANSI accreditation (<https://www.ansi.org/accreditation/faqs.aspx#2>)

<sup>23</sup> European Commission (2017), EU Guidelines for the Waste Audits ([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))

<sup>24</sup> COM(2015) 595 final, Proposal for a Directive of the European Parliament and of the Council amending Directive 2008/98/EC on waste, Article 3(f), <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0098>

<sup>25</sup> Regulation (EU) No 305/2011 CPR (<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32011R0305>)

<sup>26</sup> ISO, 1996 (<http://certifications.thomasnet.com/certifications/glossary/quality-certifications/iso/iso-14001-1996/>)

**Collection of waste**<sup>21</sup> means the gathering of waste, including the preliminary sorting and preliminary storage of waste for the purposes of transport to a waste treatment facility.

**Construction and Demolition waste**<sup>21</sup> (C&D waste) is any waste generated in the activities of companies belonging to the construction sector and included in category 17<sup>27</sup> of the European List of Wastes<sup>28</sup>. The category 17 provides for codes for several individual materials that can be collected separately from a construction or demolition site. It includes waste streams [hazardous and non-hazardous; inert, organic and inorganic] resulting from construction, renovation and demolition activities. C&D waste originates at sites where construction, renovation or demolition takes place. Construction waste contains several materials, often related to cut-offs or packaging waste. Demolition waste comprises all materials found in constructions. Renovation waste can contain both construction-related materials and demolition-related materials.

**Co-processing**<sup>29</sup> is the term used when introducing alternative fuels and raw materials into a standard production process, rather than using conventional fuels and raw materials.

**Deconstruction**<sup>30</sup> means removal of building elements from a demolition site in order to maximize their recovery and reuse.

**Decontamination**<sup>29</sup> is reduction or removal of chemical agents.

**Final recycling process**<sup>29</sup> means the recycling process which begins when no further mechanical sorting operation is needed and waste materials enter a production process and are effectively reprocessed into products, materials or substances<sup>31</sup>.

**Fixation materials**<sup>29</sup> include non-structural materials (all materials apart from aggregates).

**Hazardous C&D waste**<sup>29</sup> is defined as debris that has hazardous properties and that may prove to be harmful to human health or the environment. This comprises contaminated soil and dredging spoil, materials and substances that may include adhesives, sealants and mastic (flammable, toxic

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<sup>27</sup> In addition, other categories may apply as well in case of deconstruction, f.i. cat 16 (TL lamps, ...)

<sup>28</sup> European List of Wastes

<sup>29</sup> European Commission (2016), EU Construction and Demolition Waste Protocol ([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))

<sup>30</sup> European Commission (2017), EU Guidelines for the Waste Audits ([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))

<sup>31</sup> COM(2015) 595 final, Proposal for a Directive of the European Parliament and of the Council amending Directive 2008/98/EC on waste, Article 2(f) (<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0098>)

or irritant), tar (toxic, carcinogenic), asbestos-based materials in the form of respirable fibre (toxic, carcinogenic), wood treated with fungicides, pesticides, etc. (toxic, ecotoxic, flammable), coatings of halogenated flame retardants (ecotoxic, toxic, carcinogenic), equipment with PCBs (ecotoxic, carcinogenic), mercury lighting (toxic, ecotoxic), systems with CFCs, insulation containing CFCs<sup>32</sup>, containers for hazardous substances (solvents, paints, adhesives, etc.) and the packaging of likely contaminated waste.

**Inert waste**<sup>33</sup> means waste that does not undergo any significant physical, chemical or biological transformations (for ex. concrete, bricks, masonry, tiles). Inert waste will not dissolve, burn or otherwise react physically or chemically, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm human health<sup>34</sup>.

Integrated waste management plans and strategies: a geographically based plan that promotes and supports the C&D waste management.

**Inventory**<sup>35</sup> means the list of waste types and quantities.

**Labelling**<sup>33</sup> means a certification label or symbol indicating that compliance with standards has been verified. Use of the label is usually controlled by the standard-setting body. Where certification bodies certify against their own specific standards, the label can be owned by the certification body.

**Landfill**<sup>33</sup> means a waste disposal site for the deposit of the waste onto or into land (for instance underground), including internal waste disposal sites (for instance own waste disposal carried out by the producer of waste at the place of production), and a permanent site (older than one year) which is used for temporary storage of waste, but excluding facilities where waste is unloaded in order to permit its preparation for further transport for recovery, treatment or disposal elsewhere, and storage of waste prior to recovery or treatment for a period less than 3 years as a general rule, storage of waste prior to disposal for a period less than 1 year.

**Mixed C&D waste**<sup>33</sup> is a mixture of different fractions of C&D waste.

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<sup>32</sup> Code 170603

<sup>33</sup> European Commission (2016), EU Construction and Demolition Waste Protocol ([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))

<sup>34</sup> Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste, Article 2(e), <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A31999L0031>

<sup>35</sup> European Commission (2017), EU Guidelines for the Waste Audits ([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))

**Pre-demolition audit**<sup>33</sup> is a preparatory activity with the purpose of (1) collecting information about the qualities and quantities of the C&D waste materials that will be released during the demolition or renovation works and (2) giving general and site-specific recommendations regarding the demolition process.

**Preparing for re-use**<sup>36</sup> means checking, cleaning or repairing waste materials for recovery operations. The waste, products or components of products, that have been collected by a recognised re-use operator or deposit-refund scheme, are prepared so that they can be re-used without any further pre-processing<sup>37</sup>.

**Property owner**<sup>38</sup> means the owner of the building or infrastructure, the developer or the party stated by the national legislation as the original waste holder.

**Recovery**<sup>36</sup> means any operation the principal result of which is waste serving a useful purpose by replacing other materials, which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy<sup>39</sup>.

**Recycling**<sup>36</sup> means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes<sup>40</sup>. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

**Renovation**<sup>36</sup> can be defined as work that involves the structural alteration of buildings, the substantial replacement of main services or finishes and/or the substantial changed use of floor space whilst at the same time including associated redecoration and repair works on the one hand and related new building on the other. Renovation covers all the work done to existing buildings as the four R's: renovation, rehabilitation, restoration and remodelling. Renovation is addressed from a broad perspective, including residential, historical and commercial buildings owned and managed by private/public companies or authorities.

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<sup>36</sup> European Commission (2016), EU Construction and Demolition Waste Protocol

([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))

<sup>37</sup> COM(2015) 595 final, Proposal for a Directive of the European Parliament and of the Council amending Directive 2008/98/EC on waste, Article 2(f) (<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0098>)

<sup>38</sup> European Commission (2017), EU Guidelines for the Waste Audits ([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))

<sup>39</sup> European Commission (2008), Directive 2008/98/EC  
(<http://ec.europa.eu/environment/waste/framework/index.htm>)

**Reuse**<sup>36</sup> means any operation by which products or components that are not waste are used again for the same purpose for which they were conceived<sup>40</sup>.

**Scavenging**<sup>36</sup> is the activity of identifying usable materials that takes place after demolition; in this context, particularly re-usable and recyclable materials.

**Selective demolition**<sup>41</sup> involves sequencing the demolition activities to allow the separation and sorting of building materials.

**Separated collection**<sup>41</sup> is collection where a waste stream is kept separately by type and nature so as to facilitate a specific treatment.

**Stockpiling location**<sup>41</sup> is a platform for storing waste that can be moved.

**Stripping**<sup>41</sup> is the activity of removing valuable materials from a site, installation or building that takes place before demolition.

**Waste**<sup>42</sup> means any substance or object that the holder discards or is required to be discarded<sup>13</sup> with the following exceptions: (a) uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is guaranteed that the material will be used for the purposes of construction in its natural state on the site from which it was excavated and (b) waste waters (such as trade effluent disposed of via tankers, foul sewers, surface water drains, water courses, etc.). Object is here the complete element or its part removed from the building or infrastructure during the demolition, deconstruction or renovation process, substance means the waste material that can be classified according to the European List of Wastes<sup>43</sup>.

**Waste holder**<sup>41</sup> is the waste producer or the natural or legal person who is in possession of the waste.

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<sup>40</sup> European Commission (2008), Directive 2008/98/EC  
(<http://ec.europa.eu/environment/waste/framework/index.htm>)

<sup>41</sup> European Commission (2016), EU Construction and Demolition Waste Protocol  
([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))

<sup>42</sup> European Commission (2017), EU Guidelines for the Waste Audits ([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))

<sup>43</sup> European List of Wastes



**Waste producer**<sup>41</sup> is any natural or legal person whose activities produce waste (original waste producer) or anyone who carries out pre-processing, mixing or other operations resulting in a change in the nature or composition of this waste.

**Waste management**<sup>41</sup> is the collection, transport, recovery and disposal of waste, including the supervision of such operations and the after-care of disposal sites, and including actions taken as a dealer or broker.

**Waste management plan**<sup>41</sup> sets out the approach to demolition, the treatment and logistics of the materials identified in the pre-demolition audit.

**Waste transfer station**<sup>44</sup> is any site, location, tract of land, installation, or building that is used or intended to be used primarily for transferring solid wastes.

**Waste treatment**<sup>44</sup> means recovery or disposal operations, including preparation prior to recovery or disposal.

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<sup>44</sup> European Commission (2016), EU Construction and Demolition Waste Protocol  
([https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en))



## PARADE - Best practices for Pre-demolition Audits ensuring high quality Raw materials



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